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Author(s)	Kim, Youngseok; Lee, Byeongsung; Baek, Seongmyeong et al.
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AC Losses and Construction of Prototype High-Tc Superconducting Cable

Youngseok Kim, Byeongsung Lee, Seongmyeong Baek, Sanghyun Kim

Dept. of Electrical Engineering, Gyeongsang National University

Gazwa-dong 900, chinju, Korea

Tel : +82-591-751-5345, Fax : +82-591-759-2723

E-mail : shkim@nongae.gsnu.ac.kr

1. Introduction

Superconducting power cable is one of the most promising energy application of high-Tc superconductors (HTS). Thus, we investigated previously the characteristics on electrical and mechanical Bi-2223 Ag sheathed tape. And a prototype HTS cable have been designed, constructed and tested.

2. Experiment

The construction of High-T_c Superconducting cable was insulated by kraft paper electrically on cylindrical former. And then Ag-sheathed Bi-2223 19-filamentary tape was wound around the former with pitch angle of 15° from the longitudinal axis of the former to reduce degradation of critical current density. Also, the layers of tape were wound with alternate spiral on the former to minimize effect of magnetic field and mutual inductance. The characteristics of large current were measured by four-probe method. The AC loss of the cable was calculated by power loss $V \times I$ with lock-in-technique.

3. Result and Discussion

AC transport loss of 19-filamentary tape agreed with Norris' theory(strip). The critical current of 19-filamentary cable was 240[A]. The degradation rate is 0.7 due to mechanical strain. AC transport loss of cable was 0.7[W/m] at 240[A_{peak}]. This presented value is higher than reported results. To reduce AC loss, we need the study of reducing mutual inductance of tapes and pitch angle

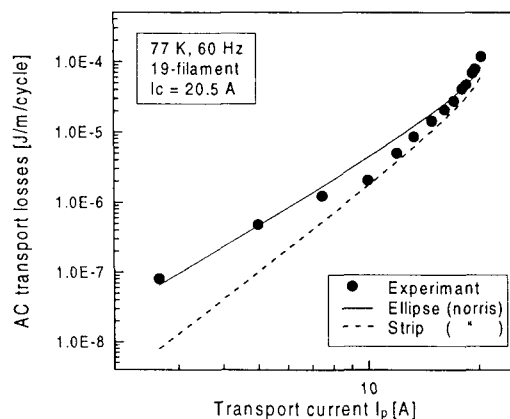


Fig. 1.

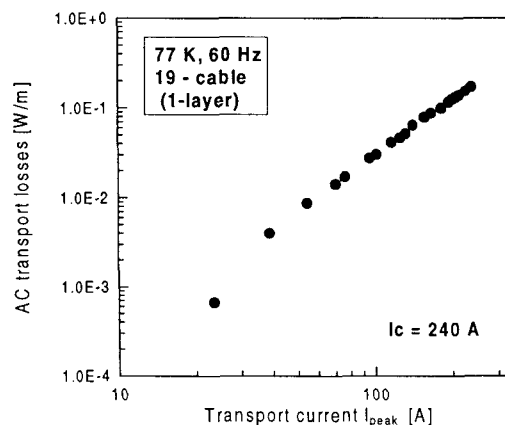


Fig. 2.

Reference

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